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**Conference of the Parties of the Stockholm  
Convention on Persistent Organic Pollutants  
Third meeting**

Dakar, 30 April–4 May 2007

Item 5 (b) (ii) of the provisional agenda\*

**Matters for consideration by the Conference of the Parties:  
measures to reduce or eliminate releases from unintentional  
production: identification and quantification of releases**

**Expert meeting to develop further the Standardized Toolkit for  
Identification and Quantification of Dioxin and Furan  
Releases\*\***

**Note by the Secretariat**

1. In paragraph 4 of its decision SC-2/5 on the ongoing review and updating of the Standardized Toolkit for Identification and Quantification of Dioxin and Furan Releases, the Conference of the Parties requested the Secretariat “to initiate an open, transparent process, in cooperation with the Chemicals Branch of the United Nations Environment Programme’s Division of Technology, Industry and Economics and in consultation with users and specialized experts in the field of emission factors and measurements related to releases of Annex C persistent organic pollutants, to develop further the Toolkit.”
2. In response to that request, the Secretariat organized jointly with the Chemicals Branch of the United Nations Environment Programme’s Division of Technology, Industry and Economics (UNEP Chemicals) an expert meeting to develop the Toolkit further, which was held from 13 to 15 December 2006 in Geneva, Switzerland. The Secretariat selected individuals to take part in the meeting from the list of experts nominated by Parties and others to be consulted on the further development of the Toolkit, which is set out in the annex to document UNEP/POPS/COP.3/INF/24. Their selection was made in accordance with the provisions of decision SC-2/5 and the principle of equitable geographical distribution. Experts from environmental and industrial non-governmental organizations were also invited. Additional experts identified by UNEP Chemicals were invited in order to provide specialized expertise in dioxin measurements or determination of emission factors.

\* UNEP/POPS/COP.3/1.

\*\* Report of the Conference of the Parties of the Stockholm Convention on Persistent Organic Pollutants on the work of its second meeting (UNEP/POPS/COP.3/30), annex I, decision SC-2/5.

3. The main issues addressed by the meeting were the elements of an open and transparent process of review and updating of the Toolkit; a summary of two expert meetings held on open burning of biomass and waste; and the determination of emission factors for the combustion of biomass and fossil fuels in power plants, boilers, and small installations.
4. Documents for the expert meeting were prepared by the Secretariat and UNEP Chemicals and included a summary of responses to the request to provide data and information to assist in the review and further development of the Toolkit. Those documents are available at the Stockholm Convention website: [http://www.pops.int/documents/meetings/cop\\_2/followup/toolkit/meetingdocs/Default.htm](http://www.pops.int/documents/meetings/cop_2/followup/toolkit/meetingdocs/Default.htm)
5. The annex to the present note contains the report of the expert meeting. It has not been formally edited.

Annex



## **Report**

# **Expert Meeting to Further Develop the Standardized Toolkit for Identification and Quantification of Dioxin and Furan Releases**

**Geneva, Switzerland  
13-15 December 2006**

UNEP Chemicals Branch, DTIE  
and  
Secretariat of the Stockholm Convention

# **Report**

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**Geneva, Switzerland  
13-15 December 2006**

UNEP Chemicals Branch, DTIE  
and  
Secretariat of the Stockholm Convention

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[http://www.pops.int/documents/meetings/cop\\_2/followup/toolkit/Default.htm](http://www.pops.int/documents/meetings/cop_2/followup/toolkit/Default.htm)



## Report

# Expert Meeting to Further Develop the Standardized Toolkit for Identification and Quantification of Dioxin and Furan Releases

Geneva, Switzerland, 13-15 December 2006

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- Annex III: PCB and PCDD/F Emissions from Simulated Forest and Landfill Fires by Emmanuel Fiani, Adème, France
- Annex IV: Toolkit Category 3: Heat and Power Generation by Heidelore Fiedler, UNEP Chemicals
- Annex V: Unintentional POPs from Biomass Combustion – First Results from a Literature Survey by Ute Karl, European Institute for Energy Research, Germany
- Annex VI: Unintentional POPs Formation from Small Scale Combustion by Stellan Marklund, Umeå University, Sweden
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# 1 OPENING OF THE MEETING

## 1.1 Background and Introduction

The Conference of the Parties to the Stockholm Convention on Persistent Organic Pollutants in its decision SC-2/5 on the ongoing review and updating of the Standardized Toolkit for Identification and Quantification of Dioxin and Furan Releases (Toolkit), requested the Secretariat “to initiate an open, transparent process, in cooperation with the Chemicals Branch of the United Nations Environment Programme’s Division of Technology, Industry and Economics and in consultation with users and specialized experts in the field of emission factors and measurements related to releases of Annex C persistent organic pollutants, to develop further the Toolkit.” The Conference of the Parties in paragraph 3 of the same decision further “notes the requests from Parties and others to verify emission factors, address gaps and otherwise improve the usefulness of the Toolkit, particularly regarding the situation in developing countries and countries with economies in transition, and for training in the use of the Toolkit” and in paragraph 6 “invites Parties and others to include in their measurement and monitoring programmes the determination of mass concentrations of not only PCDD/PCDF but also of hexachlorobenzene (HCB) and polychlorinated biphenyls (PCB) and to provide that information to the Secretariat”.

Subsequently, the Secretariat invited Parties and other stakeholders to submit *curriculum vitae* and nominate experts to participate in such process. Further, the Secretariat together with UNEP Chemicals Branch organized the Toolkit Expert Workshop at the International Environment House in Geneva from 13 to 15 December 2006. From the nominated experts, individuals were selected by the Secretariat to take part in the meeting on the basis of the criteria set out in decision SC-2/5 and geographical distribution. Representatives of both environmental and industrial NGOs are invited as well. In addition, further experts have been identified by UNEP Chemicals Branch to be invited in order to provide supporting specialized expertise in dioxin measurements or determination of emission factors.

In preparation of the Toolkit Expert Workshop a number of documents were made available to the participants before they arrived at the workshop and in addition placed on the Workshop’s WebPage [http://www.pops.int/documents/meetings/cop\\_2/followup/toolkit/Default.htm](http://www.pops.int/documents/meetings/cop_2/followup/toolkit/Default.htm). These documents included the following:

- Meeting agenda and Draft detailed agenda
- Experts nominated by Parties to be consulted in the process of further development of the Toolkit
- Possible modalities of an open, transparent and inclusive process for ongoing review and updating of the Standardized Toolkit for Identification and Quantification of Dioxin and Furan Releases
- Standardized Toolkit for Identification and Quantification of Dioxin and Furan Releases - Category 3 extracted

- Standardized Toolkit for Identification and Quantification of Dioxin and Furan Releases - Category 6 extracted
- Emisiones de dioxinas y furanos por quema incontrolada de biomasa
- Expert Workshop on Dioxin and Furan Releases from Uncontrolled Combustion - Melbourne, Australia
- Expert Workshop on Diffuse Sources of Dioxins and Furans - Mexico City (in Spanish)

Additional relevant documents may be found under the following links:

- Summary of responses to the request to provide data and information to assist in the process of review and further development of the Toolkit
- Standardized Toolkit for Identification and Quantification of Dioxin and Furan Release, Version 2.1, especially chapter 6.3 “Category 3 – Heat and Power Generation” WebPage [http://www.chem.unep.ch/pops/pcdd\\_activities/toolkit/default.htm](http://www.chem.unep.ch/pops/pcdd_activities/toolkit/default.htm) (starting on page 95; English language version);
- Revised edited guidelines on best available techniques and provisional guidance on best environmental practices relevant to Article 5 and Annex C; for download from WebPage [http://www.pops.int/documents/meetings/bat\\_bep/EGBATBEP2/meetingdocs/meetdocen.htm](http://www.pops.int/documents/meetings/bat_bep/EGBATBEP2/meetingdocs/meetdocen.htm); sections VI.C, VI.D, and VI.E;
- For the wrap-up of Category 6: Report from the Workshop in Melbourne, December 2005; WebPage [http://www.chem.unep.ch/pops/pcdd\\_activities/projects/default.htm](http://www.chem.unep.ch/pops/pcdd_activities/projects/default.htm)

## 1.2 Welcome

The meeting was opened by Ms. Fatoumata Ouane, Leader Scientific Team of the Secretariat of the Stockholm Convention and Mr. John Whitelaw, Deputy UNEP Chemicals. Both representatives underlined the task for the review and the updating of the Dioxin Toolkit as mandated in decision 2/5 of the Second Conference of the Parties. They also draw the attention to the cooperation between the Stockholm Convention Secretariat that is almost fully established in 2006 and the Chemicals Branch of the Division of Technology, Industry and Economics of UNEP. This Toolkit Expert Meeting is one of the proposed components of the open and transparent process for the Toolkit Review and Update. One of the main outcomes of this workshop will be further details of the elements, tasks and modalities for this process to be proposed to the Conference of the Parties at its third meeting in April/May 2007.

## 1.3 Introduction of Participants

The participants consisted of government-nominated experts from all five UNEP regions, NGO-nominated experts from the private and industrial sectors, additional invited experts, observers, and staff from the Stockholm Convention Secretariat, and UNEP Chemicals Branch. The participants did introduce themselves by stating their names, affiliation, and relevant activities. The list of participants is included in this document as Chapter 7.

## 1.4 Objectives of the Expert Meeting

The meeting proceeded according to the agenda as shown in chapter 6 - Agenda. The main objective as presented by the Secretariat of the Stockholm Convention and UNEP Chemicals was to “further improve the Toolkit”. Specific objectives were:

- Explore modalities of an open, transparent and inclusive process for ongoing review and updating of the Toolkit;
- Discuss and improve specific Toolkit chapters; identify gaps and short-comings; propose further activities.

For details, see Annex I “Objectives of the Toolkit Expert Meeting”.

## 2 TECHNICAL SESSIONS - TOOLKIT

### 2.1 Emission Factors for Category 6 – Open Burning

#### 2.1.1 Content of the Session

This session consisted of the following two presentations

Objectives of the Toolkit Expert Meeting

1. Annex II: Toolkit Category 6: Summary and Main Findings from Two Expert Workshops by Heidelore Fiedler, UNEP Chemicals. The slides of the presentation are given in Annex I; and
2. PCB and PCDD/F Emissions from Simulated Forest and Landfill Fires by Emmanuel Fiani, Adème, France. The slides of the presentation are given in Annex III

These two presentations formed the basis for the discussion on this issue, whose summary is presented in section 2.1.2.

#### 2.1.2 Discussion and Next Steps

In addition to the reports from the two Expert Meetings in Melbourne and Mexico City, new data generated in France were presented (by E. Fiani).

The group welcomed the information that during the next two years, a study funded by Sweden will be undertaken to revisit emission factors for open burning of waste including sampling in developing countries. Valuable input as to the study implementation was given.

A proposal to study biomass fires has been developed but so far no funding could be obtained. It was emphasized that special attention should be given to forest fires and sugarcane pre-

harvest burning. However, other agricultural residues also need further investigation.

It was re-emphasized that uncertainty and difficulties in the development of release inventories by countries includes both, the magnitude/selection of emission factors and determination of activity at the national level.

From the Biomass Working Group: for this Category 6, it is recommended that releases should/might be split into anthropogenic sources and set aside the releases generated from natural fires.

## **2.2 Emission Factors for Category 3 – Biomass and Fossil Fuel Combustion in Power Plants, Boilers, Stoves, etc.**

This session had the following ten presentations:

1. Toolkit Category 3: Heat and Power Generation by Heidelore Fiedler, UNEP Chemicals. The slides are given in Annex IV;
2. Unintentional POPs from Biomass Combustion – First Results from a Literature Survey by Ute Karl, European Institute for Energy Research, Germany. The slides are given in Annex V;
3. Unintentional POPs Formation from Small Scale Combustion by Stellan Marklund, Umeå University, Sweden. The slides are given in Annex VI;
4. PCDD/PCDF Emissions from Wood Combustion in France by Emmanuel Fiani, Adème, France. The slides are given in Annex VII;
5. Some Information about Power Generation System in Poland and Potential for Energy Production from Renewable Sources – Particularly Biomass. Dioxin and PCB Emission Preliminary Data by Adam Grochowalski, Krakow University of Technology, Poland. The slides are given in Annex VIII;
6. PCDD/F Emissions from Domestic Heating – Measurements in Austria by Gerhard Thanner, Environment Agency, Austria. The slides are given in Annex IX;
7. Unintentional POPs from Wood Combustion – Data from Switzerland by Thomas Nussbaumer, Verenum, Switzerland. The slides are given in Annex X;
8. PCDD/Fs in Fly Ash Coming from Combustion of Bagasse for Power Production in Mauritius by Nee Sun Choong-Kwet Yive, University of Mauritius, Mauritius. The slides are given in Annex XI;
9. Test Study of Polycyclic Aromatic Hydrocarbons Emission Sources by Sergey Kakareka, Institute for Problems of Natural Resources Use & Ecology, Belarus. The slides are given in Annex XII;
10. HCB and PCB Emission Source Reporting in the EMEP/CORINAIR Atmospheric Emission Inventory Guidebook by Sergey Kakareka, Institute for Problems of Natural Resources Use & Ecology, Belarus. The slides are given in Annex XIII

11. Unintentional POPs from Inventory Experiences in New Zealand and SPREP by Bruce Graham, New Zealand. The slides are given in Annex XIV.

## 2.3 Working Groups

The presentations together with the relevant chapter 6.3 of the Toolkit and other information provided by the participants formed the basis for the Working Groups. The Working Groups were tasked to further elaborate the information and report back to the plenary their results with respect to improve this section of the Toolkit. The workshop participants split into two groups whereby the first did address combustion using fossil fuels and the second using biomass. Heidi Fiedler provided guidance questions to be considered by the two working groups. The guidance questions were as follows:

**Guiding Questions for Toolkit  
Determination Emission Factors**

- Influence of fuel type
  - Coal (hardcoal, lignite, ash content)
  - Biomass (wood, one-year plants, leafy, ...)
  - Chlorine, catalytic metal, sulphur, humidity
  - Physical parameters; e.g., solid (particle size), liquid, gaseous
- Influence of combustion facility/process
  - Firing conditions (incl. temperature, oxygen)
  - Size, geometry
  - Flue gas cleaning

1

**Determination of Emission Factors**

- Regional-technological considerations
  - Definition/type of stove, boiler (developed vs. developing countries)
- Sampling and analytical considerations
  - Continuous vs. intermittent operations
  - Field blanks, process blanks
  - Acceptance of publications for inclusion
- Co-incineration (large vs. small plants)
- Gaps
  - Scientific, technical (no EF); e.g., fuel, furnace
  - Regional, laboratory vs. field experiments

2

### Determination of Emission Factors

- Inventory considerations
  - Need of EFs for residues (bottom ash, soot, fly ash)
  - Conversion factors, e.g., tons / TJ of fuel burned generates x kg (t) of residue → Databank ?
  - Conversion factors for fuel-to-gas volume → Databank ?
  - Heating values for fuels → Databank ?

3

### Determination of Activity

- Large plants
  - Sources of information
- Small / disperse combustion sources
  - “normal” activities
  - “illegal” activities
- Others

4

#### 2.3.1 Working Group 1 – Fossil Fuels

The Fossil Fuel Working Group was chaired by Ute Karl and ... served as rapporteur. The report of this Working Group was discussed in plenary and the text approved as follows:

Table 35: Emission factors for heat and power generation plants and heat/energy generating plants in industry fuelled with fossil fuels

Classification	Emission Factors - $\mu\text{g TEQ/TJ}$ of Fossil Fuel Burned		
	Air	Water	Residue
1. Fossil fuel/waste co-fired power boilers	35	ND	ND
2. Coal fired power boilers	10	ND	14
3. Heavy fuel fired power boilers	2.5	ND	ND
4. Shale oil fired power plants	1.5	ND	*
5. Light fuel oil/natural gas fired power boilers	0.5	ND	ND

\* Releases with residues can be calculated on a mass basis (see Section 6.3.1.5)

**1. Large Coal-fired Power Plants (> 50 MW<sub>th</sub>)**

1.1 Hard coal

1.2 Lignite

	Air	Residues
Influence of fuel type	German data: lignite < hard coal; further data needed	Separate bottom ash/slag and fly ash, no further data available; FGD residues?
Influence of facility/process	Influence of APCD With / without FGD	
Regional considerations	Share of old facilities	
Sampling / analytical cons.	No specific consideration Accessibility of sampling and analytical equipment	
Conversion factors		Ash generation rate + bottom ash / fly ash shares
Activity data	Normally no problem Illegal co-firing? Propose EF per t of fuel	
Gaps	Not enough data to distinguish combustion techniques	

Water: Releases from FGD with seawater scrubbing

FGD: flue gas desulfurization

**2. Co-firing in large coal-fired PP**

2.1 Co-firing of biomass

2.2 Co-firing of other materials (sewage sludge, plastic waste...)

2.1 + 2.2	Air	Residues
Influence of fuel type + co-fired material	Not enough data: perform literature survey Propose EF + ranges Heating values of co-fired material EFs specific to the ratio and material: Two tier approach for the Toolkit	
Influence of facility/process	Combustion technology: background information on typical ratios Influence of APCD With / without FGD	
Regional considerations	Consideration of local resources	
Sampling / analytical cons.	See 1	
Conversion factors	Heating values of co-fired material	
Activity data	Difficult to find statistics	
Gaps		



### 3. Small and medium size coal-fired PP

#### 3.1 Hard coal

#### 3.2 ....

	Air	Residues
Influence of fuel type	Higher variety of fuels Briquettes	Separate bottom ash/slag and fly ash, no further data available; FGD residues?
Influence of facility/process	Higher variations with technology Influence of APCD With / without FGD	
Regional considerations	Share of old facilities	
Sampling / analytical cons.	No specific consideration Accessibility of sampling and analytical equipment	
Conversion factors		Ash generation rate + bottom ash / fly ash shares
Activity data	Less information compared to LCP Illegal co-firing? Propose EF per t of fuel	
Gaps	Not enough data to distinguish combustion techniques	

### 4. Co-firing in small and medium size coal-fired PP

#### 4.1 Co-firing of biomass

#### 4.2 Co-firing of other materials (sewage sludge, plastic waste...)

	Air	Residues
Influence of fuel type + co-fired material	Not enough data: perform literature survey Propose EF + ranges Heating values of co-fired material	
Influence of facility/process	Combustion technology: high variety of techniques applied Influence of APCD With / without FGD	
Regional considerations	Consideration of local resources; Waste incineration when management systems are missing	
Sampling / analytical cons.	See 1	
Conversion factors	Heating values of co-fired material	
Activity data	Difficult to find statistics Higher rate of illegal co-firing	
Gaps		

## 5. Heavy fuel oil fired boilers

	Air	Residues
Influence of fuel type + co-fired material	Co-firing of waste oils (limited knowledge on composition) High share in total consumption (ca. 25-50%)	
Influence of facility/process		
Regional considerations	Co-firing widely applied, <i>e.g.</i> , in Latin America	
Sampling / analytical cons.		
Conversion factors		
Activity data	High level of illegal co-firing of waste oil Quantity known only for authorized co-firing	
Gaps	Few studies on emissions available	

## 6. Peat fired boilers

Further information needed:

- Irish dioxin inventory 2000: Peat combustion: 8.5-9.64 µg TEQ/TJ (air)
- Light fuel oil:
- Irish dioxin inventory 2000: 0.4-2.1 µg TEQ/TJ (air)

Table 39: Emission factors for fossil fuel based domestic heating

Classification	Emission Factors - µg TEQ/TJ of Fossil Fuel Burned Air	Concentrations – ng TEQ/kg Ash Residue
1. High chlorine coal-fired stoves	15,000	30,000
2. Coal fired stoves	100	5,000
3. Oil fired stoves	10	NA
4. Natural gas fired stoves	1.5	NA

### 1. Coal-fired stoves and boilers

1.1 Hard coal-fired stoves

1.2 Briquette fired stoves

1.3 High chlorine coal or co-firing of other materials

	Air	Residues
Influence of fuel type + co-fired material	High chlorine coal: Toolkit value confirmed by recent studies	
Influence of facility/process	Operation mode important: continuous <i>vs.</i> intermittent Distinguish central heating boilers <i>vs.</i> stoves Further studies needed to identify influence	
Regional considerations	New information from Chinese inventory: 100 Mio t coal consumed in domestic furnaces → Ashes: 21 kg TEQ/a 5000 ng TEQ/kg ash needs to be checked	
Sampling / analytical cons.		
Conversion factors		
Activity data		
Gaps		Review bottom ash data for coal firing

Heavy fuel oil for domestic applications!

Additional explanations needed for LPG, kerosene, ...

General: indicate ranges together with exact values

Note with respect to analytical methods:

- (1) when determining emission factors under co-firing conditions, a larger dataset of experiments is recommended (← because of memory effects)
- (2) Present stack sampling methods, *e.g.*, EN-1948, EPA 23, do not seem to be appropriate to capture the emissions from start-up and shut-down phases at small installations

### 2.3.2 Working Group 2 – Biomass

This Working Group was chaired by Mr. Bruce Graham and Mr. David Niimi served as rapporteur. The report of this Working Group was discussed in plenary and the text approved as follows:

#### **Determination of Emission Factors (ref. Slide 1)**

- Influence of fuel type
  - Type → See Spreadsheet
  - Chlorine, catalytic metal, sulphur, humidity, salt
  - Anthropogenically derived contamination
    - Salt (NaCl)
    - Pesticides (PCP, *etc.*)
    - Metal (Cu, Cr, Pb, *etc.*)
    - Paint and other surface coatings
    - Plastics
    - Creosote
    - Flame retardants.
  - Physical parameters; *e.g.*, solid (particle size), liquid, gaseous
- Influence of combustion facility/process
  - The government is encouraged to utilize its circumstances to apportion the emission factor to the particular use.
    - (for a specific emission factor for well designed plant operated well and the same device in a poorly designed plant operated poorly)
      1. Provide a default higher single emission factor then considerations and multiplier for the emission factor for the basis of the calculation
      2. 2 EFs values assigned: % plants to the minimum and a % to the maximum.
    - Need to keep it simple! Enable the user to easily make an informed decision. Advice to governments as to how, why, and to explain their decisions for particular choices of emission rates.
    - More work when data is in front of the Toolkit developer.
  - Firing conditions (incl. temperature, oxygen, time, turbulence)
  - Size, geometry
  - Flue gas cleaning

**Toolkit Emission Factors (ref Slide 2)**

- Regional-technological considerations
  - Definition/type of stove, boiler (developed *vs.* developing countries)
  - Proper attention should be given to indigenous considerations.
  - There are technologies that are not currently covered in the Toolkit and emission factors need to be determined. (*e.g.*, open wood cooking fires, hangi)
  - Guidance on Activities rate. (guidance on collecting the data and methodologies to determine.)
  - Ash: Quantity generated, where to place it in the inventory.
  - Characterization of the local biomass.
    - Effects of using metal and ceramic pots over open fires.
    - Assumption that all emissions go to air for indoor open cooking fires.
    - Starting fires with plastic (polyethylene)
- Sampling and analytical considerations –Yes!
  - Continuous *vs.* intermittent operations
  - Field blanks, process blanks
  - Acceptance of publications for inclusion
  - Chlorine and other trace elements contained in fuels.
  - Moisture content
    - Laboratory test *vs.* reality
- Co-incineration (large *vs.* small plants) Co-firing of waste in a biomass facility
  - This would generally be considered to be “heavy contamination”.
- Gaps
  - Cultural issues, issues with Activity rates dealing with the public (*e.g.*, RWC), ways and means of estimating the activity rates, use of census.
  - Assumptions and uncertainties, stated and un-stated. Statistical techniques to develop.
  - Severe lack of PCB and HCB EFs.
  - Considerations and proper use of statistical data, *e.g.*, waste.
  - Natural sources. Anthropogenic fires. (Category 6)
  - Scientific, technical (no EF); *e.g.*, fuel, furnace
  - Regional, laboratory *vs.* field experiments
- Inventory considerations (ref. SLIDE 3)
  - Need of EFs for residues (bottom ash, soot, fly ash), also in processes not yet covered, such as gasification of wood
  - Conversion factors, *e.g.*, tons / TJ of fuel burned generates a certain quantity of residue → Databank ?
  - Conversion factors for fuel-to-gaseous volume in combustion process → Databank ?
  - Charcoal and other missing heat contents
  - Heating values for fuels → Databank ?

**ACTIVITY (ref SLIDE 4)**

- Large plants
  - Sources of information
- Small / disperse combustion sources
  - “normal” activities
  - “illegal” activities

Region- or sector-specific recommendations for the development of activity rates, from surveys through generalizations to come up with a first cut rough estimate.

More attention needs to be paid towards this aspect of the equation. Including the assumptions, uncertainties. Develop Check list??

**Others**

- Back calculate to adjust for methodological variations in the activity rate or the emission factor chosen.

Table: Matrix of parameters to consider when determining emission factors

3b: Non-residential Biomass Combustion non-residential heat and / or power generation	Section		Control Devices			Contaminated			Physical Parameter: Fuel Size	Combustion Influences Firing 3b 3a
	3b	3d	3b			Clean	Lightly	Heavy		
			APC	APC	APC					
3d: Household heating and cooking with Biomass										
Biomass (wood, one-year plants, leafy, ...)										
Herbaceous biomass										
Bagasse			ESP, WS	no APC	no APC					N/A
Crop Residues (rice husk, coconut, corn cobs, coffee res)			ESP, WS	no APC	no APC					N/A
Straw / Grass			ESP, WS	no APC	no APC					N/A
Woody Biomass (Old biomass)										
Wood			ESP, WS	no APC	Adv Comb, catalyst					Yes
Bark, saw dust, etc (Black Liquor solids, Ch 7)			ESP, WS	no APC	Adv Comb, catalyst					N/A
Liquid biomass fuels			SEE Section 7							
Vegetable oils (eg: Canola, ...)			ESP, WS	no APC	no APC					N/A
Ethanol			no APC	no APC	no APC					N/A
Peat (Fossil group)				no APC	no APC					Potential
Charcoal Burning (Biomass Based)					no APC					N/A
Manure (dung etc)					no APC					Potential
Gassification process (to be addressed in future)										
Charcoal production (Biomass based)										

- Salt (NaCl)
- Pesticides
- Metal
- Paint
- Plastics
- Flame retardants

### **3 MODALITIES OF AN OPEN, TRANSPARENT AND INCLUSIVE PROCESS FOR ONGOING REVIEW AND UPDATING OF THE TOOLKIT**

#### **3.1 Introduction**

Katarina Magulova of the Stockholm Convention Secretariat introduced the paper “Possible Modalities of an open, transparent and inclusive process for ongoing review and updating of the Standardized Toolkit for Identification and Quantification of Dioxin and Furan Releases” (see Annex XV).

In addition to the reports from the two working groups (see sections 3.2 and 3.3), a paper on developing country concerns was prepared by Mr. Charles Mirikau, which can be found as Annex XVI.

#### **3.2 Report from Working Group 1**

##### **Activities and procedures**

How could be the information necessary to improve, revise and update the Toolkit obtained (*e.g.*, submissions by parties, literature search, measurement activities organised by the secretariat and executed by UNEP Chemicals (covered from the special trust fund), bi-lateral projects, other projects)?

- Periodic e-mail requests
- Secretariat periodically requests information and performs literature searches for new / updated information (members of the expert group submit as well)
- Web clearing house operated by the secretariat.
- Distribute information on the gaps to help scope out future projects keeping in mind the information gaps in developing countries.
- Promotion of Bilateral activities and transfer of skills
- Assistance to translation (availability)
- Parametric approach – regional group concept, utilize demographic information to predict activities and emissions patterns (~rapid assessment).

How (according to what criteria and by whom) should be the quality of data to be included into the Toolkit evaluated?

- Error bounds for information provided by the authors
- Compliance with Standard methods by testing countries
- Subgroup (~5 people focused on issue) nominated by the Toolkit expert group (the Group!)

What should be the tasks of the “specialized Toolkit experts and users”? *e.g.*, :

- Provide existing relevant national information
- Analyse available information and propose revision and updating of the Toolkit
- Identify still existing gaps
- Agree and undertake activities to fill these gaps and share the new information
  - Identify criteria for data quality for emission factors to be considered for inclusion into the Toolkit
  - Assess training and capacity building needs for Parties to evaluate current and projected releases and develop release estimates of unintentional POPs
  - Expert group members could possibly provide technical input into the various aspects of Inventory development to developing countries. (*e.g.*, surrogates for missing demographic information, input to requirements for potential inventory performers)
  - Sharing of information
  - Development of a Rapid Assessment Toolkit (RAT)
  - Training, capacity building, train the trainers, broader than government personnel.
    - Specialized sectoral focus groups / training / synergy with the BAT/BEP Experts
    - Cultural
  - Collation and review of countries inventories for the purpose providing regional information to assist reporters and research

What should be the Status of the Expert Group.

- To be an expert group, not an expert body.
- Note though that the status of the group should be periodically reviewed by the COP.
- Meeting report should ask UNEP Chemicals and the secretariat to express support for the expert group process.
- Status of the experts – represent the country or act in a personal capacity not government representatives. Check with the Montreal Protocol.

## **Periodicity**

Periodicity of the Toolkit meetings

- Annual, with the encouragement with the use of electronic means of communication to move forward the intersessional work of the group.
- *Ad hoc* Regional meetings focusing on the developing countries.
- *Ad hoc* specialized content meetings of experts.

Venue of the meetings

- Countries of Expert group members may offer to host the meeting.

(Language of meetings)

- English, polite,



### Periodicity of Toolkit revision

- On going process, collect information as it becomes available, synthesize and make available to the group
- Decides 1 year before the COP whether to recommend a revision

### Publishing and commenting of Toolkit parts revised by the Expert group under it's Terms of Reference

- As required in consideration of new / updated information, as approved by the greater expert group (Roster).
- Put on website as preliminary version that has agreed to by the expert group but has not yet been officially adopted by the COP for consideration of the countries for use in their inventories.

### Periodicity of consideration of the revised parts by the COP

- As long as the Toolkit is undergoing continual update the need for the actual adoption is lessened.
- Meeting agendas and content should be somewhat flexible

## Participation

Number and regional distribution of the “representative Roster sample” (alternatively, it may be open for participation and only the sponsored participants could be limited)

- Invited members to the expert group would be from the parties
- Meeting to be at about 20 – 40 participants.
- Observer status attendees allowed.
- NGO experts required, to be nominate through the Stockholm convention nominated NGOs, may be from any country.
- Independent experts may be invited from anywhere including non-parties as required.
- Roster is open for the continued evolution of the group.
- Consideration should be given to adequate regional representation of attending experts.

How the expert group is to be established (or leave to the Secretariat to call up the group on *ad hoc* basis)

- The Secretariat has established the expert group through the use of the decision 5 of the COP 2

Other participants in meetings (invited resource persons, observers...)

- Ad hoc as required (*e.g.*, people with specialized knowledge)

Mandate and tasks of the expert group

- See the activities.

Involvement of other experts included in the Toolkit Expert Roster

- Electronic communication.

Other???

- The Toolkit to be easily used and interpreted by anyone.
- Need a mechanism to take into account the comments of the users of the Toolkit.
- Experience and lessons learned through the use of the Toolkit to be disseminated.
- View of the group is considered by the whole group, silence interpreted as acceptance of the view.

### 3.3 Report from Working Group 2

#### Activities and procedures

How could be the information necessary to improve, revise and update the Toolkit obtained (*e.g.*, submissions by parties, literature search, measurement activities organised by the secretariat and executed by UNEP Chemicals (covered from the special trust fund), bi-lateral projects, other projects)?

- UNEP should promote local initiatives for data generation and collection
- Create a harmonised data collection format
- Central validation and extraction of information relevant to the Toolkit
- Internet based feed-back mechanism

How (according to what criteria and by whom) should be the quality of data to be included into the Toolkit evaluated?

- Expert panel per source category

What should be the tasks of the “specialized Toolkit experts and users”? *e.g.*:

- Provide existing relevant national information
- Analyse available information and propose revision and updating of the Toolkit
- Identify still existing gaps
- Identify possible new sources to be covered
- Agree and undertake activities to fill these gaps and share the new information
- Identify criteria for data quality for emission factors to be considered for inclusion into the Toolkit
- Assess training and capacity building needs for Parties to evaluate current and projected releases and develop release estimates of unintentional POPs
- Etc.

## Periodicity

Periodicity of the Toolkit meetings

- 2x between COP3 and COP4
- Virtual meetings on categories more frequently

Venue of the meetings

- ?

(Language of meetings)

- English

Periodicity of Toolkit revision

- Depending on COP, potentially 2 years periods

Publishing and commenting of Toolkit parts revised by the TOR

- Category specific small groups submit proposals to the whole group
- Posting on www after adoption by the whole expert group
- Periodicity of consideration of the revised parts by the COP
- New editions will be proposed by the expert group

## Participation

Number and regional distribution of the “representative Roster sample” (alternatively, it may be open for participation and only the sponsored participants could be limited)

- Present meeting as a model

How to put the expert group in place (or leave to the Secretariat to call up the group on ad hoc bases)

- Create small (virtual) expert groups per source category

Other participants in meetings (invited resource persons, observers...)

- Open to observers and invited resource persons
- BAT/BEP expert group as a model

Mandate and tasks of the expert group

- No limitations in proposal of changes to the Toolkit
- Analysis of first experiences with the Toolkit
- Proposal of quality control procedures
- Assessment of data quality of the submitted inventories (Introduction of a review process.)
- Development of acceptance criteria

Involvement of other experts included in the Toolkit Expert Roster

- Yes

### 3.4 Summary of Discussions

Possible elements, tasks and modalities of an open, transparent and inclusive process for ongoing review and updating of the Toolkit were discussed in two discussion groups and summarized in the plenary. The participants draw the following conclusions and recommendations:

- In follow up to the COP decision SC-2/5 the Secretariat established the Toolkit Expert Roster by inviting parties and others to nominate Toolkit experts and/or users. All experts from this roster (the Toolkit experts) should be involved in the Toolkit review and updating process. The Toolkit Expert Roster should remain open for further entries.
- General tasks to be undertaken are specified in paragraph 3 of the COP decision SC-2/5. Detailed specific tasks and activities to be undertaken as priorities were discussed and agreed in the technical sessions of the present meeting;
- The Secretariat should facilitate collection of relevant information and data from Parties and others, as well as from other reliable sources; process, and compile them in cooperation with UNEP Chemicals, and make them available for consideration of the Toolkit experts.
- The Toolkit experts should agree on data quality criteria to secure that only scientifically sound information is included into the Toolkit.
- Regular Toolkit expert meetings should be performed as necessary and appropriate; yearly meetings were proposed between the COP-3 and COP-4. In addition, inter-sessional work should be undertaken by electronic means.
- Toolkit expert meetings participants (20-40) should be drawn from the Toolkit Expert Roster considering specific topics of the meeting, as well as regional distribution and balance between developed and developing Parties, and NGO participation. Meetings should be open for observers. Further resource persons may be invited to provide specific expertise. Participation in the present expert meeting may be used as a model.
- Revised/updated/new Toolkit chapters should be made public on the WEB, after being approved by the Toolkit experts. Parties and others would be invited to use them and provide their comments. Third Toolkit revision should be available for consideration of the COP at its fourth meeting in the year 2009.
- Training for all regions (except WEOG) will be necessary before the next reporting round focusing on: i) revision and recalculation of the first PCDD/PCDF inventory considering the revised Toolkit and possible availability of more accurate activity data for the base year; ii) elaboration of the second PCDD/F release inventory to be reported in the year 2010.

## 4 RECOMMENDATION AND NEXT STEPS

Intersessional work (preferably by electronic means) will be initiated for the review and updating of the Toolkit that includes:

- Provision of initial values for emission factors (see Table Biomass and prepare for fossil fuels) using the resources available from meeting participants and also the full Expert Roster Group (including relevant unpublished data available to them);
- These values could then be used to guide decisions if the tables could be simplified;
- Experiences to be gained at country level as to the applicability of the parameters/criteria contained in the matrices;
- Preparation of a paper outlining existing experience with demographic approaches to provide surrogate data for activity rates;
- Consideration of preparation of a RAT (Rapid Assessment Tool).
- Make available a software for inventory compilation;
- Starting compilation of critical information such as demographic data, GMP, consumption, *etc.*;
- Compilation of lessons learned from first inventories;
- Recommendation that countries undertake recalculating of earlier inventories on the basis of experiences gained and possibly updated emission factors and revised activity rates, if necessary;
- Encourage countries to submit their PCDD/PCDF release inventories to be placed on the UNEP Chemicals WebPage.

Validation of emission factors, closure of gaps and highly uncertain data

- Establishing a list of priority needs to undertake sampling and analysis, for example forest fire, sugarcane; small scale enterprises in developing countries and countries with economies in transition, such simple stoves in developing countries (charcoal and wood); fuels such as dung, peat, heavy oil in domestic stoves;
- Welcome the projects undertaken in countries to generate emission factors to continue and share their results with the Group and invite them to share results and experiences (present examples from Austria, France, and Sweden). For example, Austria invites input to the project (see presentation by G. Thanner);
- Encourages the initiation of similar projects on bilateral or multi-lateral basis involving developing countries;

### Training

- Needs identified; maybe undertaken on regional or sectorial basis for users of the Toolkit and for trainers;

## **5 CLOSURE OF THE EXPERT MEETING**

After exchange of words and courtesy by the organizers and participants of the Workshop, the meeting was closed on Friday, 15 December 2006, at 18:15 hours.

## 6 AGENDA

<b>Wednesday, 13 Dec 2006</b>		
8:00-9:00	Registration	
9:00	Opening of the Meeting	John Whitelaw, Deputy UNEP Chemicals and Fatoumata Keita-Ouane, Leader Scientific Team, Secretariat of the Stockholm Convention
	Introduction of Participants	
	Objectives of the Expert Meeting	UNEP Chemicals/SSC
	Organizational Matters	UNEP Chemicals
10:00-10:30	<i>Coffee Break</i>	
10:30-12:30	<b>Emission Factors for Category 6 – Open Burning</b>	
	Results of the workshops in Melbourne and Mexico City	Heidelore Fiedler, UNEP Chemicals
	Results from France	Emmanuel Fiani, France
	Discussion and next steps, including establishment of workplan	
12:15-14:00	<i>Lunch Break(including trip to Palais and lunch)</i>	
<b>14:00-17:30</b>	<b>Emission Factors for Category 3 – Biomass and fossil fuel combustion in power plants, boilers, stoves, etc.</b>	
14:30-14:45	Emission factors used in the Toolkit	Heidelore Fiedler, UNEP Chemicals
14:45	Unintentional POPs from biomass combustion – First results from a literature survey	Ute Karl, European Institute for Energy Research, Germany
15:00-15:30	<i>Coffee Break</i>	
15:30	Unintentional POPs Data from Sweden	Stellan Marklund, Sweden
15:50	Unintentional POPs Data from France	Emmanuel Fiani, France
16:10	Unintentional POPs Data from Poland	Adam Grochowalksi, Krakow University, Poland
16:30	Unintentional POPs Data from Austria	Gerhard Thanner, Austria
16:50	Unintentional POPs from wood combustion – Data from Switzerland	Thomas Nussbaumer, Verenum, Switzerland
17:30	Adjourn	
<b>Thursday, 14 Dec 2006</b>		
9:00-10:30	Role of Biomass/Fossil Fuel Use in Energy and Heating Sector - Presentations (cont'd)	
	Mauritius	Nee Sun Choong-Kwet Yive, University of Mauritius

	Belarus	Sergey Kakareka, Belarus
	New Zealand and Pacific Islands States	Bruce Graham, New Zealand
	Introduction to working groups: (a) fossil fuels, (b) biomass	
10:30-11:00	<i>Coffee Break</i>	
	Working groups (cont'd)	
12:30-14:00	<i>Lunch Break</i>	
	Working groups (cont'd)	
15:30-16:00	<i>Coffee Break</i>	
	Working groups (cont'd)	
<b>Friday, 15 Dec 2006</b>		
9:00-10:30	Modalities of an open, transparent and inclusive process for ongoing review and updating of the Toolkit: Experts and elements	Katarina Magulova, Secretariat of the Stockholm Convention
10:30-11:00	<i>Coffee Break</i>	
10:30-12:30	Break-out into Two working Groups	Katarina Magulova, SSC
12:30-14:00	<i>Lunch Break</i>	
14:00-15:30	Presentation of results from Working groups and consolidated report	
15:30-16:00	<i>Coffee Break</i>	
16:30-17:30	Next steps	SSC and UNEP Chemicals
	Closure of the Expert Meeting	SSC and UNEP Chemicals



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## **8 ANNEXES: PRESENTATIONS AND PAPERS GIVEN AT THE TOOLKIT EXPERT WORKSHOP**

- Annex I: Objectives of the Toolkit Expert Meeting
- Annex II: Toolkit Category 6: Summary and Main Findings from Two Expert Workshops by Heidelore Fiedler, UNEP Chemicals Branch
- Annex III: PCB and PCDD/F Emissions from Simulated Forest and Landfill Fires by Emmanuel Fiani, Adème, France
- Annex IV: Toolkit Category 3: Heat and Power Generation by Heidelore Fiedler, UNEP Chemicals
- Annex V: Unintentional POPs from Biomass Combustion – First Results from a Literature Survey by Ute Karl, European Institute for Energy Research, Germany
- Annex VI: Unintentional POPs Formation from Small Scale Combustion by Stellan Marklund, Umeå University, Sweden
- Annex VII: PCDD/PCDF Emissions from Wood Combustion in France by Emmanuel Fiani, Adème, France
- Annex VIII: Some Information about Power Generation System in Poland and Potential for Energy Production from Renewable Sources – Particularly Biomass. Dioxin and PCB Emission Preliminary Data by Adam Grochowalski, Krakow University of Technology, Poland
- Annex IX: PCDD/F Emissions from Domestic Heating – Measurements in Austria by Gerhard Thanner, Environment Agency, Austria
- Annex X: Unintentional POPs from Wood Combustion – Data from Switzerland by Thomas Nussbaumer, Verenum, Switzerland
- Annex XI: PCDD/Fs in Fly Ash Coming from Combustion of Bagasse for Power Production in Mauritius by Nee Sun Choong-Kwet Yive, University of Mauritius, Mauritius

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- Annex XII: Test Study of Polycyclic Aromatic Hydrocarbons Emission Sources by Sergey Kakareka, Institute for Problems of Natural Resources Use & Ecology, Belarus
- Annex XIII: HCB and PCB Emission Source Reporting in the EMEP/CORINAIR Atmospheric Emission Inventory Guidebook by Sergey Kakareka, Institute for Problems of Natural Resources Use & Ecology, Belarus
- Annex XIV: Unintentional POPs from Inventory Experiences in New Zealand and SPREP by Bruce Graham, New Zealand
- Annex XV: Possible Modalities of an open, transparent and inclusive process for ongoing review and updating of the Standardized Toolkit for Identification and Quantification of Dioxin and Furan Releases
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